

HIGH TEMPERATURE SUPERCONDUCTIVITY

BRINGING NEW POWER TO ELECTRICITY

NEWS UPDATE

20 July 2001

CONTENTS

- [White House Energy Event in Cleveland Focuses on Superconducting Motor](#)
 - [Environmental and Energy Study Institute Briefing to Focus on Superconductivity](#)
 - [2001 Superconductivity Peer Review Starts Soon](#)
 - [American Superconductor Unveils World's First 5,000-hp Superconducting Motor](#)
 - [Intermagetics Stock Moves to Nasdaq](#)
 - [Update on Detroit Edison Project](#)
 - [Southwire Cable Project Exceeds 8,000 Hours Online](#)
 - [News from 2001 International Workshop on Superconductivity](#)
 - [Wired Magazine Looks at Nation's Future Energy Infrastructure](#)
-

WHITE HOUSE ENERGY EVENT IN CLEVELAND FOCUSES ON SUPERCONDUCTIVITY

—1,600-hp Superconducting Motor Demonstrated for Transportation Secretary Mineta



David Driscoll of Rockwell Automation explains the finer points of superconductivity while Secretary Mineta looks on. (Photo courtesy Rockwell Automation)

[Secretary of Transportation](#) Norman Y. Mineta chose the U.S. DOE [Energy Efficiency and Renewable Energy Program's](#) superconducting motor project to highlight the Administration's national energy strategy. On Monday (16 July), [Rockwell Automation](#) presented an overview of the company's energy efficiency initiative before Secretary Mineta, Ohio Governor Bob Taft, and a number of Ohio state congresspersons at the company's Advanced Development Laboratory in Euclid, Ohio.

"I am impressed and excited about the groundbreaking technology taking place at Rockwell Automation," stated Mineta, who visited Rockwell Automation to highlight President Bush's National Energy Policy.

After being welcomed by Rockwell Automation Chairman of the Board and Chief Executive Officer Don H. Davis, the group was given a tour of the Euclid laboratory. First on the tour was a demonstration of a high-temperature superconducting Reliance® motor (HTS), operating at 1,600 horsepower. Just last year, Rockwell Automation, in cooperation with the U.S. Department of Energy's (DOE) Superconductivity Partnership Initiative (SPI), achieved a key benchmark toward commercializing HTS motors by demonstrating a 1000 horsepower motor, at that time the largest motor of its type to ever be demonstrated.

"On behalf of President Bush and Vice President Cheney, I congratulate you and your exceptional team on the success of your commercial-scale 1,000 horsepower high-temperature superconductor motor," commented Mineta. "With so many potential applications, this motor serves as an excellent example of a new era in America."

After the tour of the superconducting lab, Rick Payton, director, motor marketing, Rockwell Automation spoke on the savings associated with the use of energy efficient systems in industry, as well as the future of superconducting technology. "We have entered the 21st century with an energy crisis," comments Payton. "The electric motor consumes over 60% of the total industrial demand for power, as it converts electric energy to the mechanical energy necessary to do work. Improving electric motor efficiency will reduce power costs, and consideration of more efficient mechanical components driven by that motor will reduce them even further."

Dave Petro, business manager, Reliance Electric drives, Rockwell Automation revealed another energy saving opportunity through the use of a variable speed pump demonstrator. This demonstrator depicts the significant energy consumption reduction possible by varying the speed of a motor to control flow instead of using a valve in the system. "Pumping is industry's largest application, and the use of adjustable speed drives to control flow offers industrial users more than energy savings," Petro explained. "The variable frequency drive scales the system to fit the flow required so no energy is wasted."



Rick Payton, director of motor marketing, speaks on the savings associated with the use of energy efficient systems in industry. Photo courtesy Rockwell Automation.

Following the completion of the demonstrations, Secretary Mineta addressed the gathering of Ohio elected officials, Rockwell Automation employees, and media. "I want to again congratulate Rockwell Automation for taking the lead in helping business utilize resources and optimize energy costs by accelerating market applications with real quantifiable savings that improve everyone's bottom line," stated Mineta.

[from company press release at
http://www.reliance.com/news/press_releases/press_7_16_01.html] [[▲ BACK TO TOP](#)]

ENVIRONMENTAL AND ENERGY STUDY INSTITUTE BRIEFING TO FOCUS ON SUPERCONDUCTIVITY

—Washington Briefing to Provide Overview of Technology

Industry leaders, along with representatives from the [U.S. Department of Energy](#), will present a public briefing on the latest developments in electric power applications of high-temperature superconductivity. This briefing will take place at 10:00 a.m. on Friday, August 3 in room 2168 Rayburn (the "Gold Room") of the U.S. Capitol.

All interested parties are invited to attend this briefing, which will provide interesting first-hand accounts on how public-private partnerships (in the U.S. DOE Superconductivity Program) are helping to move superconducting power applications closer toward the commercial marketplace.

The briefing's sponsor, the [Environmental and Energy Study Institute](#) (EESI), "helps meet the critical need for timely information, the exchange of ideas, and rigorous policy debate on major environmental and energy issues. EESI promotes the development of public policy options that will sustain people, the environment and natural resources."

For more information on the briefing, visit www.eesi.org or contact EESI's [Beth Bleil](#) at 202-662-1885. [[▲ BACK TO TOP](#)]

2001 SUPERCONDUCTIVITY PEER REVIEW STARTS SOON

This year's annual Superconductivity Peer Review is scheduled for 1-3 August in Washington, D.C. Last year's event set a new attendance record, drawing over 170 participants from 28 states and nine foreign countries.

DOE's Superconductivity Peer Review is noted for its stimulation of innovation in the field while at the same time enhancing the program's accountability. For more information on these events, refer to the July 2000 issue of Superconductivity News Update.

Registration information for the 2001 Superconductivity Peer Review is available at www.eren.doe.gov/superconductivity/calendar.html. [[▲ BACK TO TOP](#)]

AMERICAN SUPERCONDUCTOR DEMONSTRATES WORLD'S FIRST HTS 5,000-HORSEPOWER ELECTRIC MOTOR

—Patented, Ultra-Compact Design Expected to Open New Markets in Energy Conversion

[American Superconductor Corporation](#) of Westborough, Massachusetts announced on Wednesday that it has built and demonstrated the world's first 5,000-horsepower (hp), high temperature superconductor (HTS) electric motor. The company's patented, ultra-compact HTS electric motors are designed to reduce manufacturing costs of industrial

and ship propulsion motors by up to 40 percent compared with conventional motors. The electrical losses of HTS motors, which utilize HTS wires instead of copper wires on the rotor, are also much lower, which translates into significant fuel savings and lower operating costs.

American Superconductor's prototype 5,000-hp HTS motor is about the size of a household refrigerator. It is as little as half the size and weight of a conventional 5,000-hp motor. Its net electrical losses, including losses associated with cryogenic cooling of the HTS wires, are up to half the electrical losses of a conventional motor.



Conventional motor (left) compared with new superconducting motor on right. Graphics courtesy American Superconductor.

Motors over 1,000 hp utilize approximately 25 percent of all electric power generated in the United States. The Department of Energy estimates that the lower electrical losses of HTS motors could save U.S. industry billions of dollars per year in electrical operating costs.

“HTS technology opens the door to radically new designs and market opportunities for electric motors and for the industrial and transportation systems in which they are utilized,” said Greg Yurek, chief executive officer. “By delivering more power in a smaller package that operates with lower electrical losses at essentially the same price, we are creating entirely new value propositions for our customers.”

Yurek added that American Superconductor's Electric Motors and Generators business is focused on development and commercialization of electric motors over 1,000 hp and electric generators over 10 megawatts. Electric generators involve essentially the same technology as motors. “We plan to field additional prototype motors and generators over the next two years and we are on track for commercial sales in 2004,” he said.

Industry experts estimate that the current market for industrial electric motors with power ratings over 1,000 hp, used in applications such as pumps, fans and compressors, is approximately \$1.2 billion per year worldwide. A major new market emerging for high-power electric motors is electric ship propulsion. According to industry experts, the current annual global market for electric motors utilized for electric propulsion in commercial cruise and cargo ships is approximately \$250 million. The market for ship propulsion motors is expected to grow rapidly to over \$1 billion per year by 2010 because electric drives are becoming the propulsion system of choice for both commercial and Navy ships.

The company is currently working under a contract from the U.S. Navy's Office of Naval Research to design and develop HTS ship propulsion motors up to 33,500 hp for application in electric warships (see <http://www.amsuper.com/navyupdate.htm>). The company expects sea trials of its HTS ship propulsion motors by the end of 2003.

[From company press release at <http://www.amsuper.com/5000htsmotor.htm>]

[[▲ BACK TO TOP](#)]

INTERMAGNETICS STOCK MOVES TO NASDAQ

The common stock of [Intermagnetics General Corporation](#) of Latham, N.Y., began to be traded on the [Nasdaq National Market](#) on 11 July under the ticker symbol IMGC.

“We believe moving to Nasdaq will enhance our recognition as an attractive growth company and our visibility as a leading player in the emerging field of Energy Technology,” said Glenn H. Epstein, president and chief executive officer. “We expect the move will improve the liquidity of Intermagnetics’ common stock, making it even more attractive to many institutional investors. Additionally, our peer companies in Energy Technology and related fields also trade on Nasdaq.”



The Nasdaq tower announcing the official trading of Intermagnetics on the NASDAQ, July 11, 2001. Photo courtesy Intermagnetics General.

As part of the welcoming ceremony hosted by Nasdaq, Epstein officially opened the market for regular trading at 9:30 a.m. on July 11.

In addition, the [Frank Russell Company](#), which publishes the widely followed Russell Indexes, has announced that Intermagnetics is among the companies added to the Russell 3000® index of

the 3000 largest publicly traded companies in terms of market capitalization. Intermagnetics also is now a member of the Russell 2000® Index of smaller-capitalization stocks within the Russell 3000.

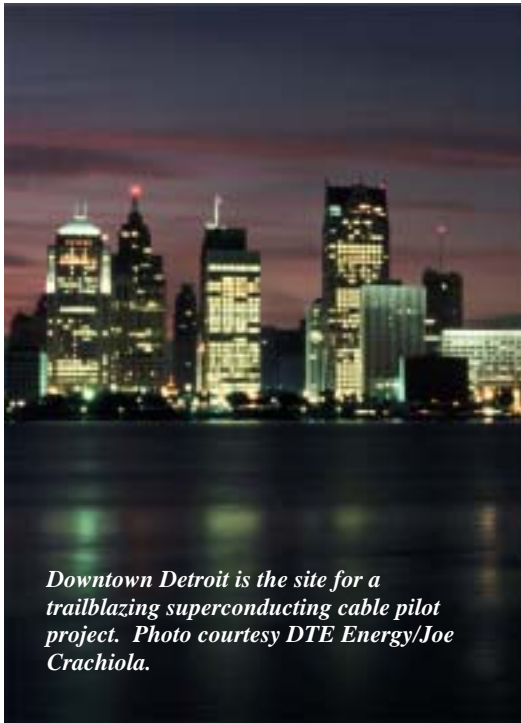
“Our recent inclusion in the Russell indexes also should benefit our stock’s visibility,” Epstein said. “This, coupled with the support we anticipate from the Nasdaq market makers who will be trading our stock, make us confident that our shareholders will benefit in the long-term.”

In related news, the company announced yesterday that its fourth-quarter earnings exceeded targets and that its earnings per share were up 48 percent for the year. Epstein reports that this growth is expected to continue and that the company anticipates increasing its staffing level by about another 100 people during the next fiscal year.

[from Company press releases, available at http://www.prnewswire.com/cgi-bin/micro_stories.pl?ACCT=no&TICK=IMGC&STORY=/www/story/07-09-2001/0001528008&EDATE and at http://www.prnewswire.com/cgi-bin/micro_stories.pl?ACCT=no&TICK=IMGC&STORY=/www/story/07-19-2001/0001536365&EDATE] [[▲ BACK TO TOP](#)]

CABLES INSTALLED IN DETROIT EDISON PROJECT

Detroit Edison reports that all three of its 400-foot long superconducting power cables have been installed in underground conduits. Personnel are now working on the terminations (where the cables hook up on either end). In addition, a field splice — executed in a manhole — is complete.



Downtown Detroit is the site for a trailblazing superconducting cable pilot project. Photo courtesy DTE Energy/Joe Crachiola.

Detroit Edison's Jon Jipping, acting director of Power Delivery Planning, reports that "the cable was pulled through the conduits much like conventional cable would be pulled, with one exception: curved rollers were used at the ends to aid the pulling effort and to keep the radius of the cable curve from getting too small (bending) and possibly damaging the cable."

Jipping said that the company hopes to have the project complete by late summer, with testing to follow.

This is the first project in the world to retrofit a superconducting power cable system into an operating utility substation. The three-phase HTS cable circuit, after being installed in Detroit Edison's Frisbie Station, is designed to transmit 100 MVA of power, serving approximately 14,000 customers.

For more information on the Detroit Edison project, see the Superconductivity News Updates of [December 2000](#) and [May 2001](#). [[▲ BACK TO TOP](#)]

SOUTHWIRE CABLE PROJECT EXCEEDS 8,000 HOURS ONLINE —Successful project switches to unattended operation

On 5 January 2000, [Southwire Company](#) of Carrollton, Georgia, launched a new superconducting power delivery pilot project in which superconducting power distribution cables provide electricity to three Southwire manufacturing plants in Carrollton, Georgia. This project represented a breakthrough in making the difficult transition from laboratory testing to a practical field application. Nearly immune to resistance, Southwire's superconducting cables lose only about a half-percent of power during transmission, compared to 5 to 8 percent lost by traditional cables. The cables also deliver more power—about three to five times more than traditional power cables.

David Lindsay, Southwire's Senior Development Engineer, notes that "based on the reliable performance of the system since it was energized in January 2000, we made the transition to unmanned operations on June 1, 2001. We feel this move will help us

continue to prove to utility companies that high-temperature superconducting cable technology is viable for commercial applications.”

Regarding the switch to unmanned operation, Lindsay said that “minor modifications were made to the PLC control system which operates the cable and cryogenic systems to allow for safe unmanned operations. Since June 1st, the system has continued to perform perfectly. There have been no outages due to problems at the site. The three Southwire manufacturing facilities have had 100% run-time. To date, the system has over 8,100 hours of operation at the 100% load level, with over 700 of those hours unmanned.”

Southwire’s project was co-funded by the U.S. Department of Energy through a Superconductivity Partnership Initiative award. Earlier this year, Southwire announced a one-year anniversary milestone of 5,000 hours operation (for more information, visit <http://www.southwire.com/news/011100-1.htm>). [[▲ BACK TO TOP](#)]

NEWS FROM 2001 INTERNATIONAL WORKSHOP ON SUPERCONDUCTIVITY

—Breakthroughs in Coated Conductors Highlighted at June Conference

The 2001 International Workshop on Superconductivity was held from June 24 through 27 in Honolulu, Hawaii with the theme of “HTS Conductors, Processing and Applications.” It was the fifth Joint Workshop co-sponsored by the [International Superconductivity Technology Center of Japan](#) (ISTEC) and the [Materials Research Society](#) (MRS), based in Warrendale, Pennsylvania.



Photo courtesy ISTEC.

More than 80 scientific papers were presented during the technical sessions of the workshop, and one participant noted that “the highlight of the Hawaiian workshop was the progress made on producing long lengths of coated conductors by Dr. Y. Ijima at [Fujikura Ltd.](#) in Japan and Dr. Herbert C. Freyhardt of Germany’s [Universität Göttingen](#). Both achieved outstanding superconducting properties in lengths between 5-50 meters using a combination of Ion Beam Assisted Deposition and Pulsed Laser Deposition.

U.S. organizations that helped support this important conference included [Argonne National Laboratory Superconductivity Center](#), [IGC-SuperPower LLC](#), [Los Alamos National Laboratory Superconductivity Center](#), [National High Magnetic Field Laboratory of Florida State University](#), [Oak Ridge National Laboratory Superconductivity Center](#), [Texas Center for Superconductivity at the University of Houston](#), [Brookhaven National Laboratory](#) and the [University of Wisconsin Applied Superconductivity Center](#).

For more information on this event, visit <http://www.istec.or.jp/indexE.html>.
[[▲ BACK TO TOP](#)]

WIRED MAGAZINE LOOKS AT NATION'S FUTURE ENERGY INFRASTRUCTURE

In its July issue, [Wired magazine](#) takes an in-depth look at our nation's future energy infrastructure in a cover story entitled "The Energy Web." Particular attention is given in the article to activities of the [Electric Power Research Institute](#) (EPRI), whose President and CEO, Kurt Yeager, is quoted as saying "the current power infrastructure is as incompatible with the future as horse trails were to automobiles."

Examining new energy technologies from fuel cells, superconducting cables, photovoltaics and microturbines, reporter Steve Silberman notes that "the best minds in electricity R&D have a plan: every node in the power network of the future will be awake, responsive, adaptive, price-smart, eco-sensitive, real-time, flexible, humming and interconnected with everything else."

This fascinating article is available at
http://www.wired.com/wired/archive/9.07/juice_pr.html. [[▲ BACK TO TOP](#)]

ABOUT THIS UPDATE

The **High-Temperature Superconductivity News Update** is compiled by [Bob Lawrence & Associates Inc.](#) on behalf of the superconductivity program and is issued periodically as events warrant. Past issues are available on the U.S. Department of Energy's website at www.eren.doe.gov/superconductivity/pubs.html.

Please let me know if you would like more information or story ideas on any of these news items involving high-temperature superconductivity---a clean and capable new electricity technology for the 21st century. If you have any other comments or questions, please let me know.

Thank you very much.

[Craig Cox](#)

Bob Lawrence & Associates, Inc.
303-679-9331